

Claims

What is claimed is:

1. A nutrient absorption increasing composition
5 comprising:
 - a) a protein hydrolysis catalyzing amount of an
Aspergillus derived protease, and a catalysis enhancing
calcium compound cofactor;
 - b) a lipid hydrolysis catalyzing amount of an
10 *Aspergillus* derived lipase, and a catalysis enhancing zinc
compound cofactor;
 - c) a cellulose hydrolysis catalyzing amount of an
Aspergillus derived cellulase, and a catalysis enhancing
manganese compound cofactor; and
 - 15 d) a starch hydrolysis catalyzing amount of an
Aspergillus derived amylase, and a catalysis enhancing
magnesium compound cofactor.
2. The composition of claim 1, wherein the *Aspergillus* is
20 a species selected from the group consisting of: *A. Niger*,
A. Oryzae, *A. Aculeatus*, *A. Ochraceous*, *A. Terreus*, *A.*
Fumigatus, *A. Flavus*, *A. Ustus*, *A. Versicolor*, and mixtures
thereof.

3. The composition of claim 2, wherein the *Aspergillus* is a combination of *A. Niger* and *A. Oryzae* species.

4. The composition of claim 2, wherein the *Aspergillus* is
5 *A. Niger* species.

5. The composition of claim 2, wherein the *Aspergillus* is
A. Oryzae species.

10 6. The composition of claim 1, wherein the calcium compound is a member selected from the group consisting of: calcium ascorbate, calcium citrate, calcium carbonate, calcium amino acid chelates, and mixtures thereof.

15 7. The composition of claim 6, wherein the calcium compound is calcium ascorbate.

8. The composition of claim 1, wherein the zinc compound is a member selected from the group consisting of: zinc
20 gluconate, zinc oxide, zinc amino acid chelates, and mixtures thereof.

9. The composition of claim 8, wherein the zinc compound
25 is zinc gluconate.

10. The composition of claim 1, wherein the manganese compound is a member selected from the group consisting of manganese citrate, manganese gluconate, manganese amino acid
5 chelates, and mixtures thereof.

11. The composition of claim 10, wherein the manganese compound is manganese gluconate.

10 12. The composition of claim 1, wherein the magnesium compound is a member selected from the group consisting of: magnesium citrate, magnesium oxide, magnesium stearate, magnesium amino acid chelates, and mixtures thereof.

15 13. The composition of claim 12, wherein the magnesium compound is magnesium citrate.

14. The composition of claim 1, wherein the amount of *Aspergillus* derived protease has a protein hydrolyzing
20 activity of from at least about 1,000 HUT to about 60,000 HUT.

15. The composition of claim 14, wherein the protein hydrolyzing activity is from about 2,500 HUT to about 30,000
25 HUT.

16. The composition of claim 1, wherein the amount of *Aspergillus* derived lipase has a lipid hydrolyzing activity of from at least about 10 LU to about 800 LU.

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17. The composition of claim 16, wherein the lipid hydrolyzing activity is from about 25 LU to about 400 LU.

18. The composition of claim 1, wherein the amount of
10 *Aspergillus* derived cellulase has a cellulose hydrolyzing activity of from at least about 3 CU to about 400 CU.

19. The composition of claim 1, wherein the cellulose hydrolyzing activity is from about 6 CU to about 200 CU.

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20. The composition of claim 1, wherein the amount of *Aspergillus* derived amylase has a starch hydrolyzing activity of from at least about 1,000 DU to about 20,000 DU.

20 21. The composition of claim 20, wherein the starch hydrolyzing activity is from about 2500 DU to about 10,000 DU.

22. The composition of claim 1, wherein the calcium compound cofactor provides a ratio of at least about 1 mg of calcium for every 1200 HUT of protease activity.

5 23. The composition of claim 22, wherein the ratio is from about 1 mg of calcium for every 200 HUT of protease to about 1 mg of calcium for every 600 HUT of protease activity.

24. The composition of claim 1, wherein the zinc compound
10 cofactor provides a ratio of at least about 1 mg of zinc for every 800 LU of lipase activity.

25. The composition of claim 24, wherein the ratio is from
about 1 mg of zinc for every 25 LU of lipase to about 1 mg
15 of zinc for every 400 LU of lipase activity.

26. The composition of claim 1, wherein the manganese compound cofactor provides a ratio of at least about 1 mg of manganese for every 400 CU of cellulase activity.

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27. The composition of claim 1, wherein the ratio is from about 1 mg of manganese for every 4 CU of cellulase to about 1 mg of manganese for every 200 CU of cellulase activity.

28. The composition of claim 1, wherein the magnesium compound cofactor provides a ratio of at least about 1 mg of magnesium for every 20,000 DU of amylase activity.

5 29. The composition of claim 28, wherein the ratio is from about 1 mg of magnesium for every 1,000 DU of amylase to about 1 mg of magnesium for every 10,000 DU of amylase activity.

10 30. The composition of claim 1, further comprising a maltose hydrolysis catalyzing amount of an *Aspergillus* derived maltase.

15 31. The composition of claim 30, wherein the amount of *Aspergillus* derived maltase has a maltose hydrolyzing activity from at least about 50 DP to about 300 DP.

20 32. The composition of claim 1, further comprising a lactose hydrolysis catalyzing amount of an *Aspergillus* derived lactase.

33. The composition of claim 32, wherein the amount of *Aspergillus* derived lactase has a lactose hydrolyzing activity of from at least about 200 LacU to about 600 LacU.

34. The composition of claim 1, further comprising a sucrose hydrolysis catalyzing amount of an *Aspergillus* derived sucrase.

5 35. The composition of claim 34, wherein the amount of sucrase has a sucrose hydrolyzing activity of from at least about 50 SU to about 200 SU.

36. A nutrient absorption increasing composition
10 comprising:

a) an amount of *Aspergillus* derived protease having a protein hydrolyzing activity of from about 1,000 HUT, to about 60,000 HUT, and a calcium compound cofactor which provides calcium in a ratio of at least about 1 mg of
15 calcium for every 1200 HUT of protease activity;

b) an amount of an *Aspergillus* derived lipase having a lipid hydrolyzing activity of from about 10 LU to about 800 LU, and a zinc compound cofactor which provides zinc in a ratio of at least about 1 mg of zinc for every 800 LU of
20 lipase activity;

c) an amount of an *Aspergillus* derived cellulase having a cellulose hydrolyzing activity of from about 3 CU to about 400 CU, and a manganese compound cofactor which provides manganese in a ratio of at least about 1 mg of manganese for
25 every 400 CU of cellulase activity; and

d) an amount of an *Aspergillus* derived amylase having a starch hydrolyzing activity of from about 1,000 DU to about 20,000 DU, and a magnesium compound cofactor which provides magnesium in a ratio of at least about 1 mg of magnesium for every 20,000 DU of amylase activity.

37. The composition of claim 36, wherein the *Aspergillus* is a species selected from the group consisting of: *A. Niger*, *A. Oryzae*, *A. Aculeatus*, *A. Ochraceous*, *A. Terreus*, *A. Fumigatus*, *A. Flavus*, *A. Ustus*, *A. Versicolor*, and mixtures thereof.

38. The composition of claim 37, wherein the *Aspergillus* is a combination of *A. Niger* and *A. Oryzae* species.

39. The composition of claim 37, wherein the *Aspergillus* is *A. Niger* species.

40. The composition of claim 37, wherein the *Aspergillus* is *A. Oryzae* species.

41. The composition of claim 36, wherein the calcium compound is a member selected from the group consisting of: calcium ascorbate, calcium citrate, calcium carbonate, calcium amino acid chelates, and mixtures thereof.

42. The composition of claim 41, wherein the calcium compound is calcium ascorbate.

5 43. The composition of claim 36, wherein the zinc compound is a member selected from the group consisting of: zinc gluconate, zinc oxide, zinc amino acid chelates, and mixtures thereof.

10 44. The composition of claim 43, wherein the zinc compound is zinc gluconate.

45. The composition of claim 36, wherein the manganese compound is a member selected from the group consisting of
15 manganese citrate, manganese gluconate, manganese amino acid chelates, and mixtures thereof.

46. The composition of claim 45, wherein the manganese compound is manganese gluconate.

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47. The composition of claim 36, wherein the magnesium compound is a member selected from the group consisting of: magnesium citrate, magnesium oxide, magnesium stearate, magnesium amino acid chelates, and mixtures thereof.

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48. The composition of claim 47, wherein the magnesium compound is magnesium citrate.

49. The composition of claim 36, wherein the protein
5 hydrolyzing activity is from about 2,500 HUT to about 30,000 HUT.

50. The composition of claim 36, wherein the lipid hydrolyzing activity is from about 25 LU to about 400 LU.

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51. The composition of claim 36, wherein the cellulose hydrolyzing activity is from about 6 CU to about 200 CU.

52. The composition of claim 36, wherein the starch
15 hydrolyzing activity is from about 2500 DU to about 10,000 DU.

53. The composition of claim 36, wherein the ratio is from about 1 mg of calcium for every 200 HUT of protease to about
20 1 mg of calcium for every 600 HUT of protease activity.

54. The composition of claim 36, wherein the ratio is from about 1 mg of zinc for every 25 LU of lipase to about 1 mg of zinc for every 400 LU of lipase activity.

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55. The composition of claim 36, wherein the ratio is from about 1 mg of manganese for every 4 CU of cellulase to about 1 mg of manganese for every 200 CU of cellulase activity.
- 5 56. The composition of claim 36, wherein the ratio is from about 1 mg of magnesium for every 1,000 DU of amylase to about 1 mg of magnesium for every 10,000 DU of amylase activity.
- 10 57. The composition of claim 36, further comprising a maltose hydrolysis catalyzing amount of an *Aspergillus* derived maltase.
58. The composition of claim 57, wherein the amount of
15 *Aspergillus* derived maltase has a maltose hydrolyzing activity from at least about 50 DP to about 300 DP.
59. The composition of claim 36, further comprising a lactose hydrolysis catalyzing amount of an *Aspergillus*
20 derived lactase.
60. The composition of claim 59, wherein the amount of *Aspergillus* derived lactase has a lactose hydrolyzing activity of from at least about 200 LacU to about 600 LacU.

61. The composition of claim 36, further comprising a sucrose hydrolysis catalyzing amount of an *Aspergillus* derived sucrase.

5 62. The composition of claim 61, wherein the amount of sucrase has a sucrose hydrolyzing activity of from at least about 50 SU to about 200 SU.

63. A method of increasing absorption of nutrients in an
10 animal comprising the step of:

administering a composition having a) a protein hydrolysis catalyzing amount of an *Aspergillus* derived protease, and a catalysis enhancing calcium compound cofactor; b) a lipid hydrolysis catalyzing amount of an
15 *Aspergillus* derived lipase, and a catalysis enhancing zinc compound cofactor; c) a cellulose hydrolysis catalyzing amount of an *Aspergillus* derived cellulase, and a catalysis enhancing manganese compound cofactor; and d) a starch hydrolysis catalyzing amount of an *Aspergillus* derived
20 amylase, and a catalysis enhancing magnesium compound cofactor.